HOW A TREE GROWS

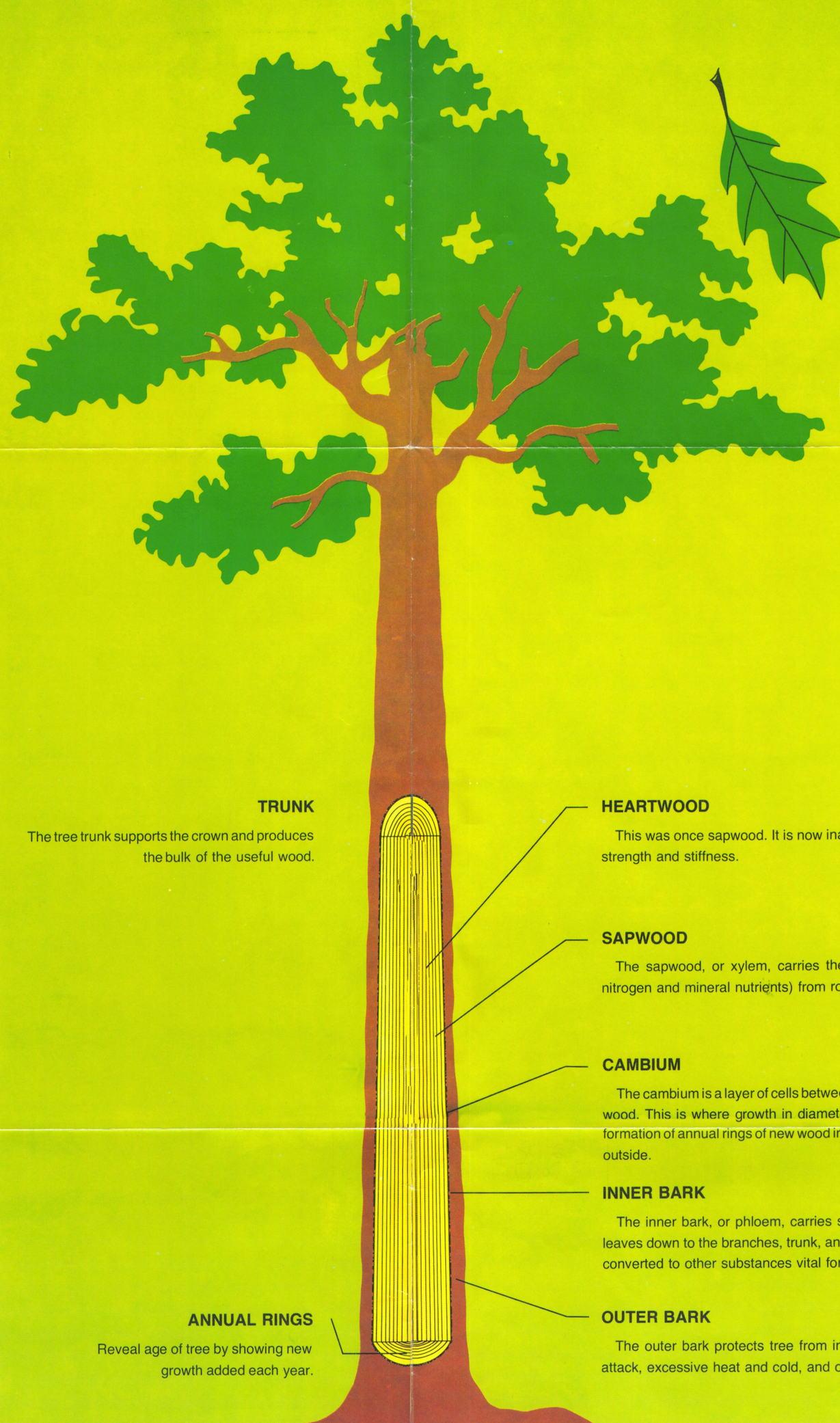
PHOTOSYNTHESIS

Plant leaves are the most important chemical factories in the world. Without their basic product, sugar, there would be little food for man or animal, no wood for shelter, no humus for the soil, no coal for fuel.

Inside each leaf, millions of green-colored, microscopic particles (called chloroplasts) manufacture sugar. They trap radiant energy from sunlight for power. Their raw materials are carbon dioxide from the air and water from the soil. Oxygen, a by-product, is released. This fundamental energy-storing, sugar-making process is called photosynthesis.

ENZYMES

What happens to the sugar made in the leaf? With the aid of chemical activators (enzymes), every living cell—from root tips to crown top—goes to work on the sugar. New products result. Each enzyme does a certain job, working with split-second timing and in harmony with the others. In general, they break down sugar and recombine it with nitrogen and minerals to form other substances such as starches, fats, oils, and proteins, which help form fruits, nuts, and seeds. They also convert some sugar to cell-wall substances such as cellulose, lignin, and suberin, which make up wood and bark.



LEAVES

The leaves make food for the tree by combining carbon dioxide from the air and water from the soil, in the presence of sunlight, to form sugar.

CROWN

Trees increase each year in height and spread of branches by adding a new growth of twigs. This new growth comes from young cells in the buds at the ends of the twigs.

TRUNK

The tree trunk supports the crown and produces the bulk of the useful wood.

HEARTWOOD

This was once sapwood. It is now inactive wood giving strength and stiffness.

SAPWOOD

The sapwood, or xylem, carries the sap (water plus nitrogen and mineral nutrients) from roots to the leaves.

CAMBIUM

The cambium is a layer of cells between the bark and the wood. This is where growth in diameter occurs with the formation of annual rings of new wood inside and new bark outside.

INNER BARK

The inner bark, or phloem, carries sugar made in the leaves down to the branches, trunk, and roots, where it is converted to other substances vital for growth.

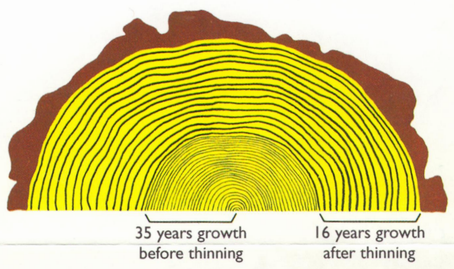
OUTER BARK

The outer bark protects tree from insect and disease attack, excessive heat and cold, and other injuries.

ANNUAL RINGS

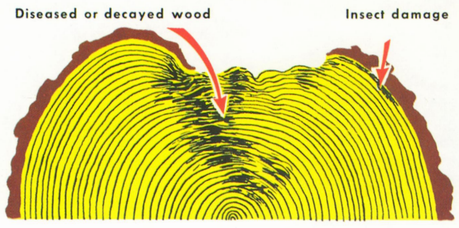
Reveal age of tree by showing new growth added each year.

THINNING INCREASES GROWTH



FIRE RUINS TIMBER

Disease and insects attack the weakened trees



TWIG GROWTH

SEED

SEEDLING

ROOTS

The roots anchor the tree, transport water and nutrients, and help hold the soil against erosion.

ROOT HAIRS

The root hairs, tubular in form absorb water and nutrients from the soil.

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